



Muller HM Data Framescanner



Reference manual

Version history

Versie	Datum	Wijzigingen	Auteur	Distributie
1.1	18-02-2011	Initial version	Roel Eckhardt	Customers Müller HM
1.4	21-04-2011	Explanation of the led lights	Leon Joanknecht	Customers Müller HM

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Daan Müller

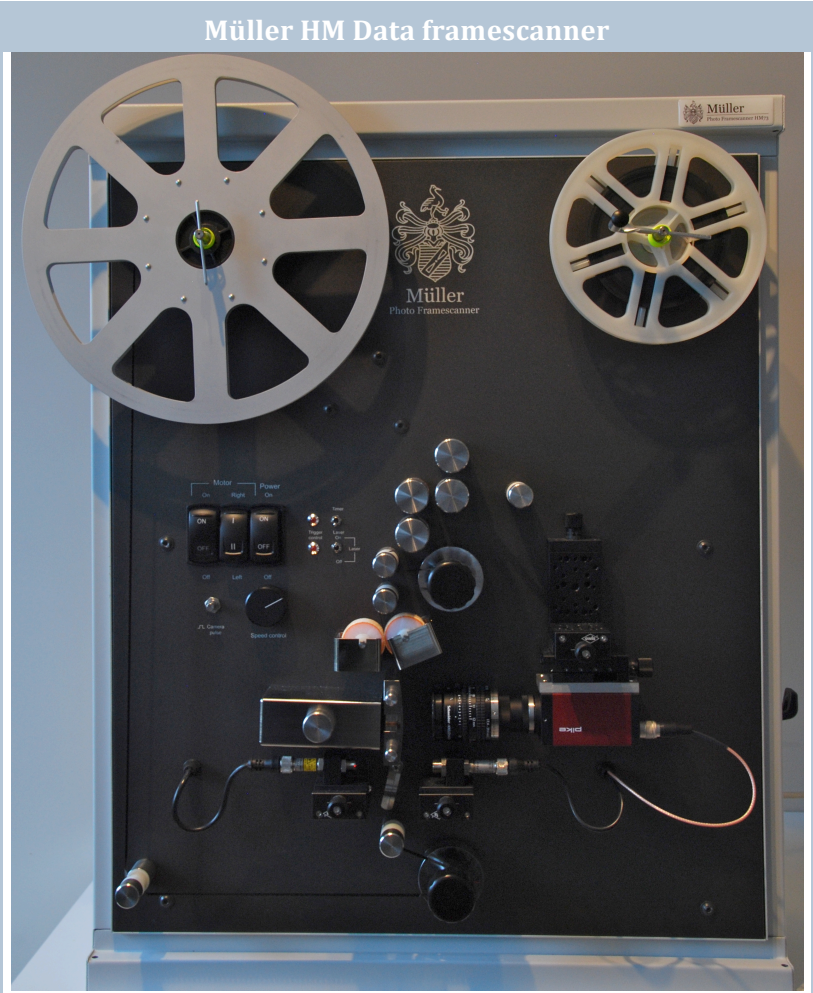
The quality of thin film is often underestimated. If we were to magnify one individual film frame we would see a tremendous quality. This quality has fascinated me and made me decide to develop a high-quality scanner for film. After three years of development, the scanner is suitable for the market. With the Müller HM we can now offer high quality scans as data, something which was formerly only accessible to professional companies.

As an instructor for practical multimedia applications to the University of Maastricht, guest lecturer at the Vrije Universiteit in Amsterdam and lecturer at the Graphic Lyceum in Eindhoven, Daan Müller has certainly earned his spurs.

The Müller HM is the first film scanner in the world that supports all movie formats up to super 16 mm. The Muller HM scans Regular 8, Super 8, Pathé 9.5, 16 mm, Super 16 and 17,5 mm film and the images are stored as data.

Each frame is individually led-flashed and recorded resulting in a superb image quality. The films are scanned directly from the film emulsion without the use of mirrors.

1. Technical specifications



1.1 Dimensions

Object	Height	Width	Depth
Data frame scanner	77cm	60 cm	40,5 cm
Lower case	77cm	60 cm	40,5 cm

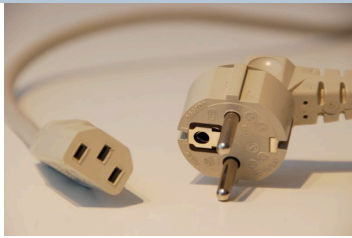

1.2 Weight

Object	Weight
Data frame scanner	43 Kg
Lower case	27 Kg

1.3 Included with standard delivery

Data frame scanner	8mm gate + 8mm capstan
	9.5 pathé gate + 9.5 pathé capstan
	16mm gate + 16mm capstan
	Power Cable (NL or UK)
	Wetgate module (1x)
	1K camera
	Schneider Kreuznach Componon 2.8/28 Macro UNIFOC12
	Lensring set 5mm, 10mm, and 20mm
	Reel spring and pin (2x)
Computer supplies	PCI express Firewire 800 card
	Firewire-800 cable
Software	AVT Smartview (32 or 64 bit)
	XML file for AVT Smartview settings
	VirtualDub (open source software) 32 Bit
	AviSynth (open source software) 32 bit
	FilmFabriek DSP (all required filters and scripts)
Manual	Reference Manual for Muller HM Data framescanner

1.4 Power cable

Power cable	
	The power cable is supplied with the Muller HM. Any computer power cable will work
	UK version of the power supply

1.5 Control Panel

Power, direction and start



1. 2. 3.

1. Motor: On/Off

Starts the motor on/off

2. Left / right

Left reverses the motor rotation

3. Power on/off

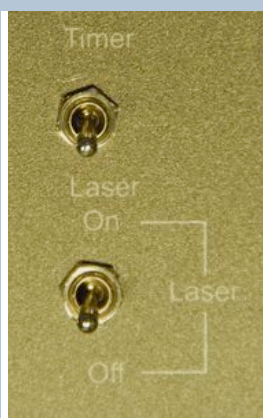
This switches on the Muller HM. (The power to the camera is not supplied by the MullerHM but by the computer through the supplied Firewire800 cable)

Speed control



Turn the speed control to right to increase the speed.

Switches



1. Timer - for focusing and testing

The timer switch is used to focus on a still image without running the film. This saves time when adjusting the camera position and not having to rewind the film back to the beginning. The timer gives an automated flash every 0,4 seconds, regardless of the laser.

2. Laser - for scanning

Turn the laser switch to ON so that when the motor is running and the perforation holes pass through the laser, the camera and the LED flash is triggered.

Pulse



Turn the pulse to the maximum right. Then turn back slightly to the left. The lower trigger control LED must remain off. There is no need to adjust the pulse. If required, a technical explanation can be given.

Led's & switches



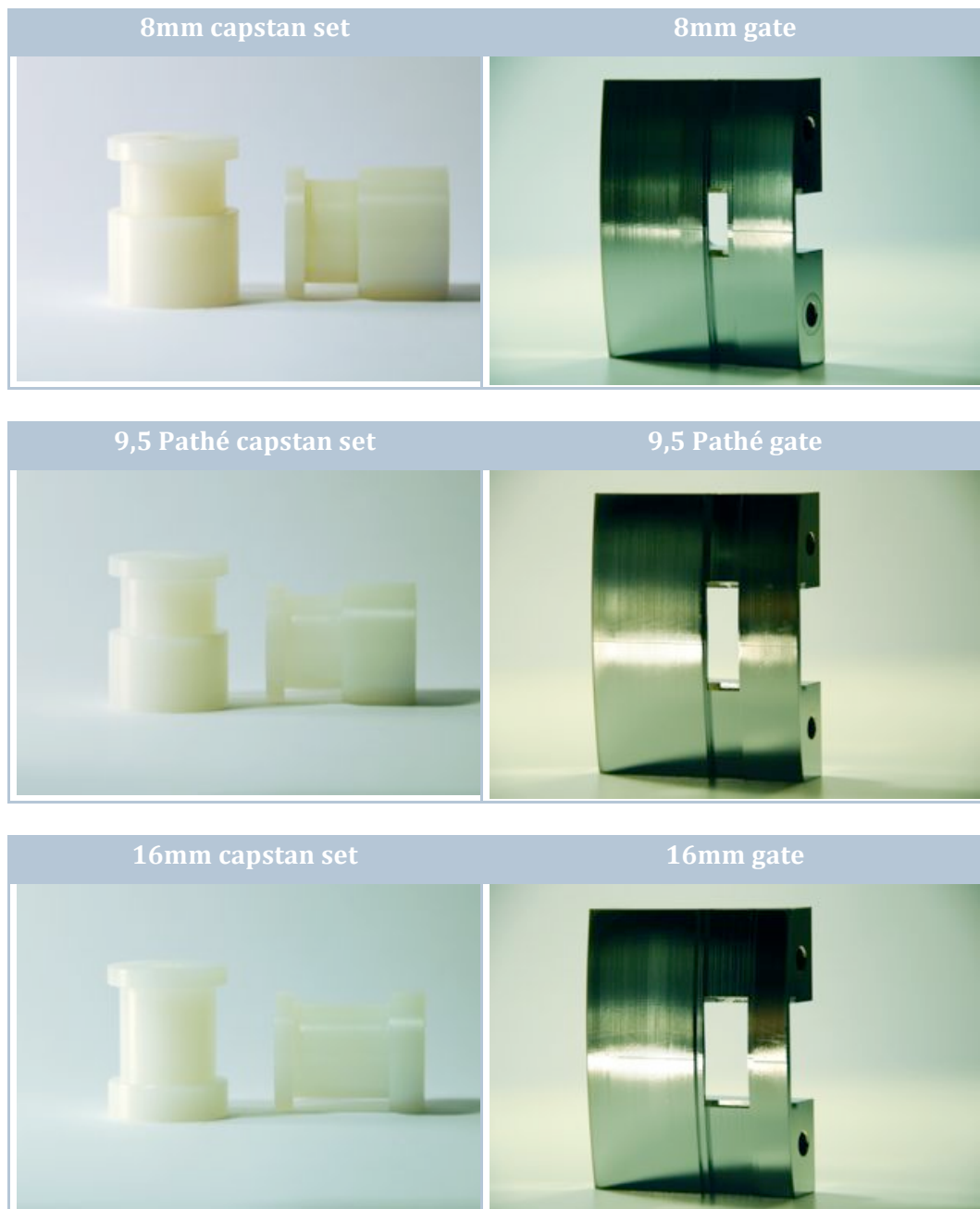
1. Trigger control (upper led)

The led-light will burn if the trigger card (mounted inside the Müller HM) sends a signal to the camera. This light is installed for service purposes.

2. Trigger control (lower led)

The led-light will burn if the trigger card (mounted inside the Müller HM) sends a signal to the flash. This light is installed for service purposes.

1.6 Film adapters



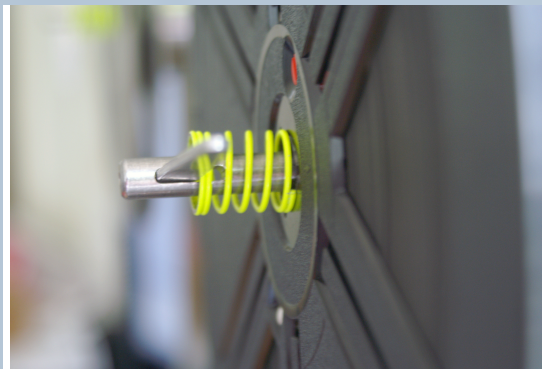
1.7 Filmreel holders

Reel sprocket set



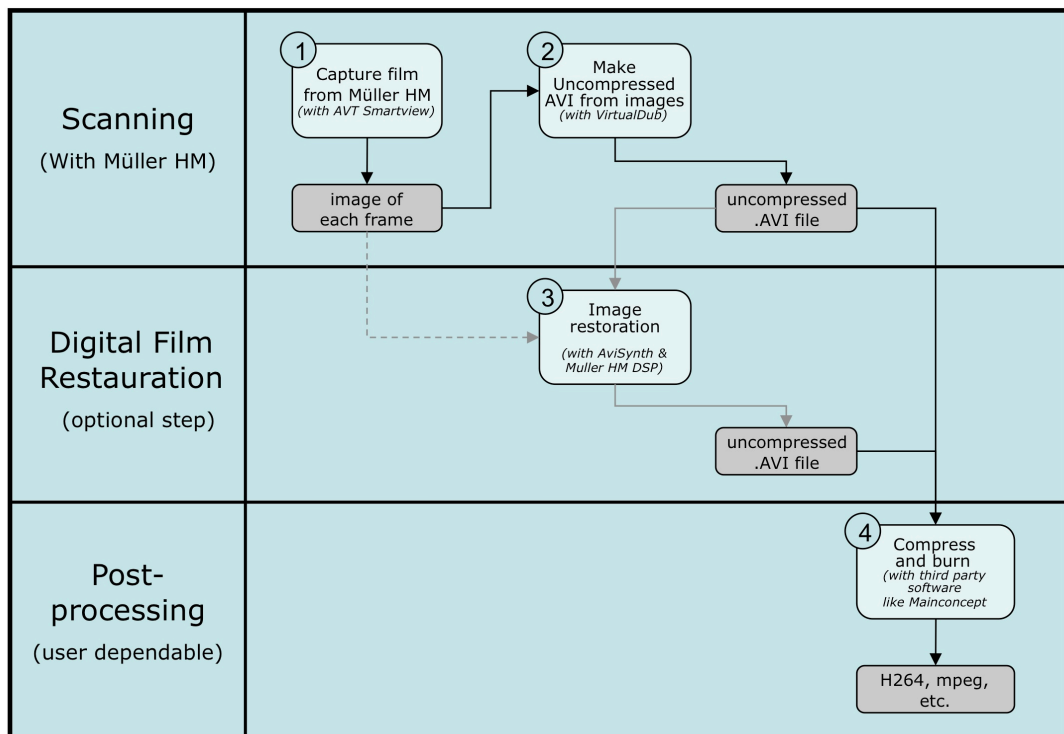
Included with the Müller HM are two sets of pins, springs and adapters for reel fixation.

The reel adaptor has a small hole which fits into the reel sprocket holder on both Müller HM reel holders.



2. Example workflow

Here is an example of a common used workflow.



Example workflow Data Framescanning

*) The duration of the DSP post-processing time depends mainly on the available CPU power and on the parameters used (light or heavy degrading, denoising and stabilization)

3. PC requirements

Scanning and capturing frames with the Muller HM dataframescanner requires only the following minimal PC capabilities:

- Windows XP or Windows 7 (32 or 64 bit)
- A minimum of two hard disks together in RAID0 mode for fast writing of scanned images
- A free PCI express slot for the included Firewire-800 PCI Express Card
- A normal / standard CPU is sufficient for capturing.

With this setup you should be able to scan images and save them to harddisk a maximum speed.

Post-processing activities (DSP restauration, compression to mpeg2, H264, etc.) require more powerfull pc capabilities. This process requires mainly CPU capabilities.

4. Software setup

4.1 AVT smartview

AVT Smartview is supplied for capturing the images to hard disk.

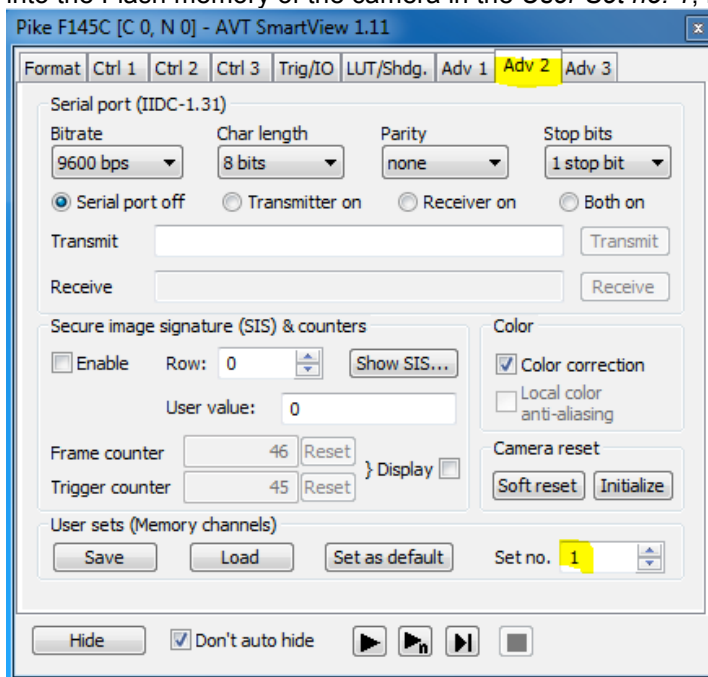
Install AVT Smartview

1. Install the AVT Smartview by downloading the [AVTFirePackage 3.0.zip](#) file from the Allied Vision Technologies website.
2. When the supplied Intek Firewire 800 PCi Express card is used, then it is recommended to also install the Intek driver to you system. This driver enables a higher speed data transfer than the the standard Microsoft supplier FireWire-800 driver.

AVT Smartview setup

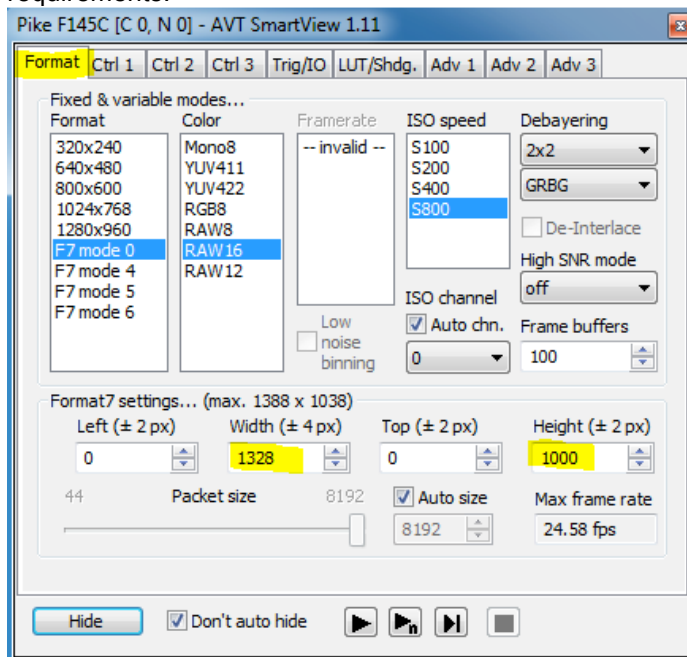
Startup AVT Smartview after install.

FilmFabriek has entered all the required settings for the Pike 145 camera and has uploaded this into the Flash memory of the camera in the *User Set no. 1*, ready to use.



You can change the settings whenever you like or you can add more user settings under Adv2 -> *Set No.* If for example you often use 720 x 576 resolution, you can save this under *Set no. 2*

In the 'Format' tab under settings you can adjust the width and height to your personal requirements.



The instructions document “Müller HM – AVT SmartView settings - Pike 145.pdf” contains a more detailed explanation of all the individual settings.

To use the real-time Gamma correction during scanning, the different Gamma values must be entered and uploaded into the camera.

See also the instructions document “Müller HM – AVT SmartView settings - Gamma/LUT.pdf”

4.2 VirtualDub

VirtualDub is used to make one uncompressed AVI file out of all the captured .bmp images.

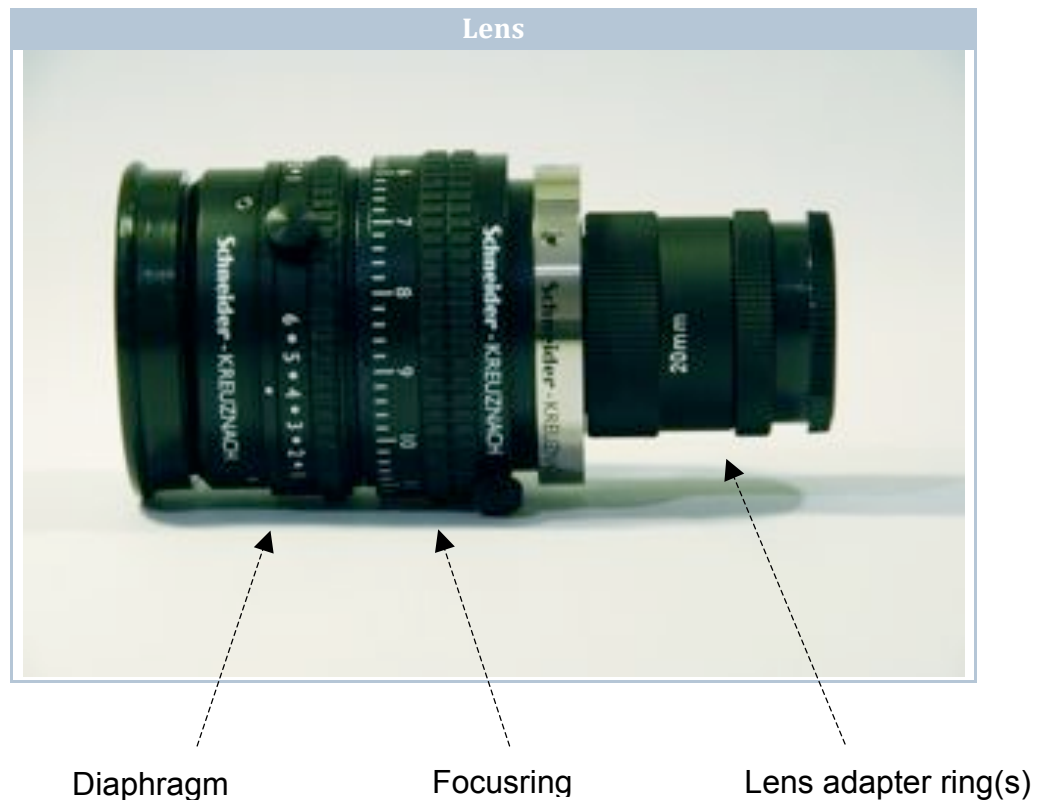
Install

1. Download [VirtualDub](#)
2. Install

Make uncompressed avi from the captured .bmp images

1. launch and open VirtualDub
2. select file > open video file (or CTRL+O)
3. select the first .bmp in your bmp directory
4. select file > save as AVI (or F7)
5. select output location for .AVI file.

5. Camera setup



5.1 Determine which lens adapter ring to use



In the table below you can determine which lensring to use for each film and image size

8mm and 9.5 pathé

Image size	Image size	Lens adapter ring	Maximum scanning speed
1328 x 1000	3,6 MB (BMP)	25mm (20mm + 5mm)	28 fps
720 x 576	1,2 Mb (BMP)	10mm	40 fps

16mm

Image size	Image size	Lens adapter ring	Maximum scanning speed
1328 x 1000	3,6 MB (BMP)	No lens adapter required	28 fps
720 x 576	1,2 Mb (BMP)	No lens adapter required	40 fps

5.2 Focus with turntable

Focus with turntable



The right knob on the horizontal turntable is used to focus.

- Press play in AVT Smartview
- switch timer ON. (see also par. 1.6)
- Turn the turntable knob far enough to get the film frame to fit into the AVT viewer window.
- Center the films (left, right, top and bottom) with the other turntables.

5.3 Diafragma

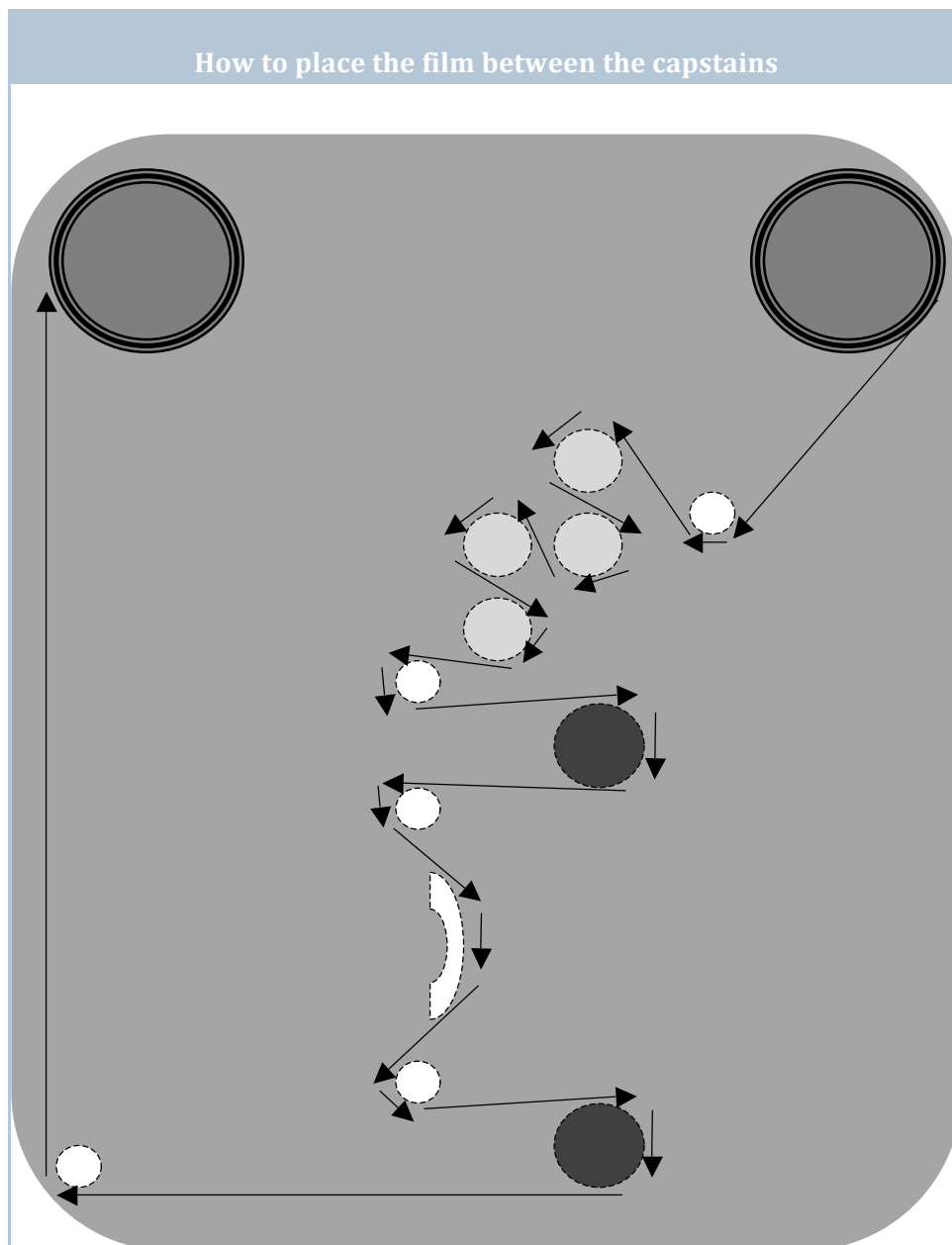
Depending on your personal requirements, the diafragma ring is usually set between 2,5 and 4

5.4 Focusing

Use the focusing for final focusing

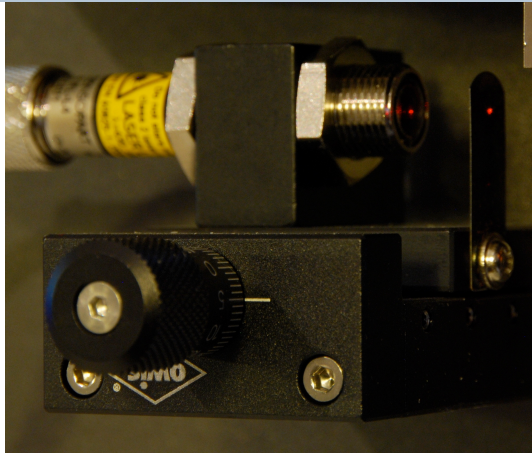
6. Mount film

1. Mount correct sprockets (for 8, 7.5 or 16mm)
2. Mount correct window (for 8, 7.5 or 16mm)
3. Mount correct lens adapter ring (see camera setup)
4. Mount reel with film on right reel holder
 - perforation holes facing towards you
 - film emulsion facing right (emulsion side always facing camera)
5. Mount empty reel on left side (motor)
6. Place film through capstans (see picture below)
7. Attach film to left reel, user motor



7. Laser setup

7.1 Align with turntable




Both lasers (left and right) should be adjusted in line with each other through the film's perforation holes. Adjusting can be done using the turntables.

- Set trigger OFF
- Set laser ON
- Run film (motor on)
- Adjust turntables until LED flashes

8. Start capturing frames

8.1 Position and Focus camera

- Set laser OFF
- Set Timer ON
- Press PLAY  in AVT Smartview
- Position the camera with turntables and look at the screen
- Focus the camera with turntable on the horizontal turntable while looking at the screen
- Focussing on the film's emulsion is usually the quickest way

When finished:

- Turn off the timer
- Make sure the reverse button is set in the correct direction
- Turn the speed knob to MEDIUM/LOW position

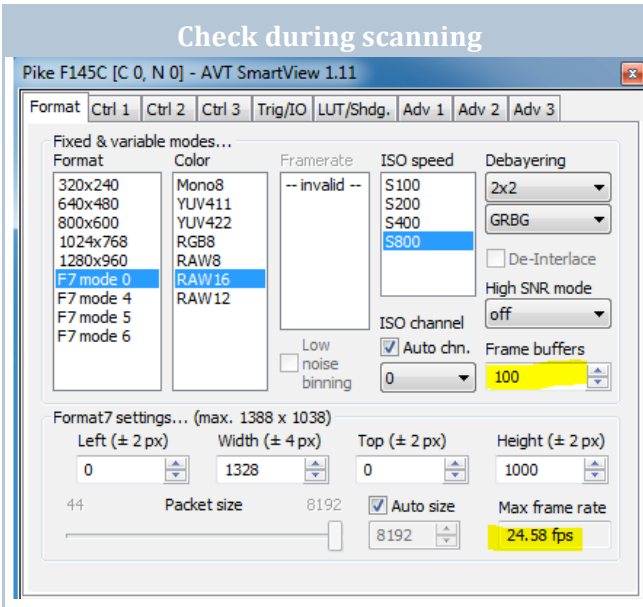
8.2 Select outputfile and location in AVT smartview

- Select FILE -> SAVE
- Select location (directory)
- Name file: 0

8.3 Start scanning

- Press REC  in AVT Smartview
- START scanner

8.4 Checks during runtime



The screenshot shows the 'Check during scanning' window in AVT SmartView 1.11. The window has a title bar 'Pike F145C [C 0, N 0] - AVT SmartView 1.11'. Below the title bar are tabs for 'Format', 'Ctrl 1', 'Ctrl 2', 'Ctrl 3', 'Trig/IO', 'LUT/Shdg.', 'Adv 1', 'Adv 2', and 'Adv 3'. The 'Format' tab is active, showing a list of 'Fixed & variable modes...' with 'F7 mode 0' selected. To the right, 'Color' is set to 'RAW16', 'Framerate' is '-- invalid --', 'ISO speed' is 'S800', 'Debayering' is '2x2', and 'Frame buffers' is '100'. At the bottom, 'Format7 settings...' are shown with 'Width' at 1328, 'Height' at 1000, and 'Max frame rate' at 24.58 fps.

The *Max. frame rate* for the entered resolution in combination with the FW800 speed is calculated here. Exceeding this scan rate might result into dropped frames. In this case the *frame buffer* counter will increase. (the film scans faster towards the end of the reel)

8.5 Adjust Gamma level during scanning (optional)

Some customers use gamma adjusting during scanning in low-light scenes.

Setup Gamma values

To use the real-time Gamma correction during scanning, the different Gamma values must be entered and uploaded into the camera.

See also the instructions document “Müller HM – AVT SmartView Gamma/LUT settings.pdf”

Use Gamma during scanning

Check during scanning

Pike F145C [C 0, N 0] - AVT SmartView 1.11

Format

Ctrl 1

Ctrl 2

Ctrl 3

Trig/IO

LUT/Shdg.

Adv 1

Adv 2

Adv 3

Lookup tables

☒ LUT operation on

LUT # 7

Edit

LUT data

<empty>

Upload

LUT file

LUT_Pike_Gamma_040_150.csv

...

Import data from column

Col B

starting at

Row 1

Shading correction

☐ Shading correction on

☐ Show shading data as image

Build

shading data from

4 images

Flash

Download & save as file

Upload from file

Clear flash

File

Shading data file

...


In the tab *LUT/Shdg.* adjusting the GAMMA values during scanning can be done by selecting the *LUT #* number with mousepointer, then use the up and down keys to adjust during scanning.

Arrow-up = more gamma
Arrow-down = less gamma

9. Wetgate setup

9.1 Wetgate parts

Wetgate supplies



The Müller HM is supplied with the rolls and pins needed for Wegate scanning.

Isopropanol can be ordered through the internet or at a local Drugstore. Isopropanol 99,8 is usually used. Using a lower percentage will prevent the Isopropanol from evaporating in time and leaving the film too wet.

9.2 Wetgate Module

Wetgate unit



The rolls are placed in the Wegate module. The rolls are moisturized with Isopropanol. The film runs between the rolls making this portion of the film wet just before approaching the camera.

Moisten the wetgate rols with the supplied squirting bottle.